

THE IDENTITIES OF THE SERICEOUS-LEAVED SPECIES OF *STIGMAPHYLLON* (MALPIGHIACEAE) IN THE AMAZON REGION

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INTRODUCTION

Stigmaphyllum, one of the Neotropical wing-fruited genera of the Malpighiaceae, includes nearly 100 species. Most are characterized by long-petioled broad leaves, yellow flowers grouped in umbels or pseudoracemes disposed in dichasially branched inflorescences, an androecium of 10 heteromorphic stamens, and a gynoecium whose 3 styles bear apical appendages, the folioles, for which the genus is named. The samara usually consists of an ovoid nut with a large flaring dorsal wing and often also with lateral ornamentation (one to several small lateral winglets, spurs, and/or crests). Both nomenclatural and taxonomic problems have confused the identities of some of the representatives occurring in the Amazon region in which the leaves are sericeous below, i.e., the trabecula of the hair straight and sessile to subsessile. This group of plants was found to comprise four species, *S. argenteum* C. Anderson (recently described), *S. cardiophyllum* Adr. Juss. (a name long ignored), *S. convolvulifolium* Adr. Juss. (the epithet traditionally attributed to Cavanilles), and *S. sinuatum* (DC.) Adr. Juss. (a name long misapplied). For these, the names *S. brachiatum* Tr. & Pl., *S. convolvulifolium* Adr. Juss., *S. fulgens* Adr. Juss., *S. hypoleucum* Miquel, *S. martianum* Adr. Juss., and *S. splendens* Cuatr. have been most commonly used. These four species are discussed here in detail. Four sympatric species, *S. lacunosum* Adr. Juss., *S. maynense* Huber, *S. paraense* C. Anderson, and *S. puberum* (Rich.) Adr. Juss. are included in the key presented below; although distinctive, they are occasionally confused with one of the other four, because they also have abaxially sericeous leaves.

The very different *S. paralias* Adr. Juss., also with the leaves sericeous below, is unlikely to be confused with any other species of the genus. It is mentioned here, because it has been recorded from the area of Tucurúi in Pará, Brazil. *Stigmaphyllum paralias* is a shrub of dry and sandy areas of eastern Brazil from Maranhão to Rio de Janeiro. Its usually elliptical to lanceolate leaves have very short petioles (up to 1.5 cm long), and the stipules are often fused across the node into a bifid structure. The inflorescence is most commonly a solitary umbel of (3-) 4-15 large flowers or sometimes a dichasium of umbels. The peduncles are very short, only 0.02-0.2 times as long as the pedicels. The greatly modified "samara" consists of a nut lacking a carpophore and bearing an apical crest, the rudimentary dorsal wing.

TAXONOMY

[Note: Atypical specimens of *S. cardiophyllum* from Ecuador, considered putative hybrids, may not key here; see discussion below under *S. cardiophyllum*.]

1. Anthers pubescent.
 2. Laminas very sparsely sericeous to glabrous below, margin with irregularly spaced sessile glands and the bases of broken-off filiform glands; anthers of stamens opposite the posterior-lateral sepals with the connective enlarged and bearing only one locule; dorsal wing of the samara 2.7–4 cm long, the nut 2.5–3.5 mm in diameter, without air chambers; along river banks in lowland and flood plain forest, at forest edge, and in secondary growth and capoeiras of Amazonian Ecuador, Peru, Brazil, and Bolivia.

S. cardiophyllum Adr. Juss.
 2. Laminas evenly sericeous below; marginal glands nail-like, i.e., a disk borne on a stalk up to 0.5 mm long (sometimes a few glands sessile); anthers of stamens opposite the posterior-lateral sepals not modified, the connective and both locules subequally long; dorsal wing of the samara reduced and ca. 2 cm high measured from base of nut, the nut ca. 12.5 mm in diameter, the locule surrounded by air chambers; along river banks and in inundated forest in Amazonian Brazil and Peru.

S. lacunosum Adr. Juss.
1. Anthers glabrous.
 3. Anterior style and its opposing stamen much larger than the posterior styles and their opposing stamens; posterior styles foliolate.
 4. Laminas sparsely sericeous below or rarely the hairs more abundant but the epidermis always visible; petals digitate-fimbriate; dorsal wing of samara erect and tapered from the base, lateral winglets and carpophore absent; in rain forests and gallery forests, along river banks, and in mangrove swamps in the West Indies, Central America, and northern South America (not reported from Ecuador); Venezuela (Delta Amacuro, Monagas), Guyana, French Guiana, Colombia (northernmost Chocó and Antioquia, Putumayo), Peru (northern Loreto, Huánuco), Amazonian Brazil (Amapá, Pará, Amazônas, Acre).

S. puberum (Rich.) Adr. Juss.
 4. Laminas very densely sericeous below, the epidermis obscured; petals erose to erose-denticulate; dorsal wing of samara flared distally, the nut bearing 3–4 lateral winglets per side, carpophore present; in wet forests and at water's edge in Ecuador (Napo, Pastaza) and Peru (Amazonas, Huánuco, Loreto, San Martín, Pasco, Madre de Dios), one collection from Brazil (southwestern Amazônas).

S. maynense Huber.
 3. Anterior style and its opposing stamen shorter than or at most subequal to the posterior styles and their opposing stamens; posterior styles foliolate or efoliolate.
 5. Stamens opposite the posterior-lateral sepals subequal to the stamen opposite the posterior petal (flag), their anthers unmodified.
 6. Laminas appearing glabrous below to the naked eye, but often very sparsely sericeous, the hairs ca. 0.1 (–0.2) mm long and widely spaced, never touching; in moist forest, along rivers, and also in secondary growth and along roadsides in Guyana, Suriname, French Guiana, and northeastern Brazil (Amapá and eastern Pará), also recorded from Martinique and Trinidad.

S. convolvulifolium Adr. Juss.
 6. Laminas sparsely to very densely sericeous below, the hairs (0.2–) 0.3–0.5 (–0.7) mm long, usually touching to overlapping; common in primary and secondary forest, especially wet forest, along rivers, in thickets, and at roadsides in Colombia, Venezuela, the Guianas, northern Brazil, Ecuador, northern Peru, and Amazonian Bolivia.

S. sinuatum (DC.) Adr. Juss.
 5. Stamens opposite the posterior-lateral sepals unlike the stamen opposite the posterior petal (flag), their anthers modified: the connective enlarged and bearing 0–2 reduced locules.
 7. Limb of lateral petals 6–7 mm in diameter, erose; nut of samara without lateral winglets and air chambers; in forests and thickets and at roadsides of eastern Peru (Huánuco, Junín, Loreto, Pasco, San Martín).

S. argenteum C. Anderson.
 7. Limb of lateral petals 10–15 mm in diameter, with fimbriae up to 0.8 mm long; nut of samara with one or more pairs of lateral winglets, locule surrounded by air chambers; in woods along rivers, in wet localities in savanna and campo, and in várzea of Brazil (Goiás, Maranhão, western Piauí, Pará).

S. paraense C. Anderson.

Stigmaphyllum argenteum C. Anderson, Novon 2: 302. 1992.—TYPE: PERU. Huánuco: Prov. Pachitea, Dtto. Honoria, Bosque Nacional de Iparia, a lo largo del Río Pachitea cerca del campamento Miel de Abejas, 1 km arriba del pueblo Tournavista o unos 20 km arriba de la confluencia con el Río Ucayali, 300–400 m, 30 May 1967, Schunke V. 2018 (holotype: NY!; isotypes: COL! F! G! US!). Fig. 1.

Vine to 14 m. Laminas 2.5–15.3 cm long, 5.7–14 cm wide, triangular, ovate, elliptical to suborbicular, or sometimes 3–5-lobed, apex acuminate, base truncate to cordate, sparsely sericeous to usually glabrous above, sericeous below (trabecula 0.2–0.5 mm long, straight, sessile), margin with irregularly spaced sessile glands (0.5–0.6 mm in diameter) and with filiform glands (up to 1.5 mm long), with a pair of prominent but sessile glands at the apex of the petiole, each gland 1.5–3.5 mm in diameter; petioles 2–10+ cm long; stipules 0.7–1.2 mm long and wide, eglandular. Flowers ca. 15–30 per umbel, these borne in dichasia or compound dichasia. Peduncles 3–7.5 mm long, pedicels 4–8.5 mm long; peduncles 0.6–1.2 times as long as the pedicels. Bracts 0.9–1.3 mm long, 0.6–1 mm wide, narrowly triangular; bracteoles 0.7–1.2 mm long, 0.6–1 mm wide, triangular, eglandular. Sepals 1.8–2.3 mm long, 1.5–2 mm wide, glands 1.6–2.3 mm long, 0.6–1.2 mm wide. Lateral petals with the limbs orbicular or broadly obovate, glabrous, yellow, margin erose; anterior-lateral petals: claw 1.8–2.2 mm long, limb ca. 7 mm long and wide; posterior-lateral petals: claw 0.5–1 mm long, limb 6–6.7 mm long, 4.5–6 mm wide; posterior petal: claw 2.5–2.8 mm long, apex strongly indented, limb 5–5.6 mm long, 3.5–4.8 mm wide, elliptical or broadly obovate, margin erose to fimbriate-denticulate, teeth/fimbriae up to 0.5 mm long. Stamens unequal, those opposite the posterior styles the largest, anthers of those opposite the lateral sepals with the connective enlarged and the locules reduced; anthers all loculate, glabrous, those of stamens opposite the anterior-lateral sepals with 1 or 2 locules, those of stamens opposite the posterior-lateral sepals with only 1 locule. Anterior style ca. 2.2 mm long, shorter than the posterior two, glabrous; apex ca. 1.5 mm long, each foliole ca. 1.4 mm long, ca. 1.2 mm wide, subsquare. Posterior styles 2.6–3 mm long, glabrous, lyrate; foliole ca. 1.4–2 mm long and wide, subsquare. Dorsal wing of samara ca. 4.5 cm long, 1.4–1.7 cm wide, upper margin with a blunt tooth, lateral winglets absent, nut only prominently ribbed; nut 4–5.5 mm high, 3.5–4.5 mm in diameter, areole 3–3.5 mm long, 2.5–2.8 mm wide, concave, carpophore up to 1.8 mm long. Embryo 5.8–7.3 mm long, ca. 2 times as long as wide, ovoid, outer cotyledon 6.1–8.3 mm long, 2.6–3.9 mm wide, the distal 1/6 folded over the inner cotyledon, inner cotyledon 4–6.6 mm long, 2–3.6 mm wide, straight or the tip folded back on itself.

Phenology. Collected in flower from April through July; in fruit in May and from July through September.

Distribution. Lowlands of eastern Peru; in forests and thickets and at roadsides; 135–670 m.

REPRESENTATIVE SPECIMENS. PERU. HUÁNUCO: Prov. Pachitea, region of Pucallpa, ca. 26 km S to 24 km SSE of Puerto Inca, N of Río Yuyapichis, 09°37'–09°34'S, 74°56'–74°53'W, Wallnöfer 11-31588 (MICH); vicinity of Tingo María, 3–5 km from Huánuco-Tingo María rd on Monzón rd, Mathias & Taylor 3647 (F, UCLA).—JUNIN: Puerto Bermudez, Killip & Smith 26630 (F, NY, US); Prov. Satipo, E bank of Río Enc at mouth of Río Quipachiri, Madison 10427-70 (F).—LORETO: Quebrada Shanuce above Yurimaguas, Croat 17999 (MICH); Isla de Ushpa-cano near mouth of the

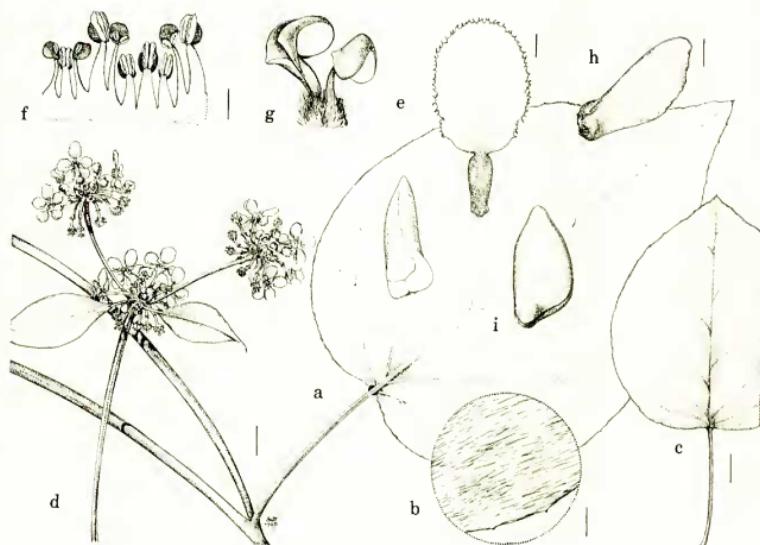


FIG. 1. *Stigmaphyllon argenteum*. a. Portion of branch with large leaf. b. Detail of abaxial surface of lamina. c. Small leaf. d. Flowering branch. e. Posterior petal. f. Androecium, second stamen from left opposes posterior petal. g. Gynoecium, anterior style to the right. h. Samara. i. Two views of an embryo. Scale for a, c, d, h, bar = 1 cm; for b, bar = 0.5 mm; for e-g, bar = 1 mm. (Based on: a, b, d-g, Schunke V. 2018; c, h, i, Croat 19640.)

Río Itaya, *Croat 19640* (MICH); Ucayali, Bosque Nacional Alexander von Humboldt, between Km 90-130 of Pucallpa-Tingo María rd, 08°48'S, 75°20'W, *Gentry et al. 41413* (MO); wooded banks on lower Río Huallaga, *Killip & Smith 29004* (F, GH, NY); Prov. Maynas, vicinity of Iquitos, Río Momón, quebrada Momoncillo, *McKenna et al. DMK-91* (AMAZ, F, MICH, MO).—PASCO: Oxapampa, ca. 5 km up Río Iscozacín from village of Iscozacín, 10°12'S, 75°13'W, *Knapp & Staver 7802A* (MICH); Palcazu Valley, Río San José in the Río Chuchurras drainage, 10°09'S, 75°20'W, *D. Smith 4002* (MICH).—SAN MARTÍN: between Tocache Nuevo and Juanjui, 18.7 km S of Río Pulcache, 07°55'S, 76°40'W, *Croat 58052* (MICH); vicinity of Aguaytía, Boquerón de Padre Abad, *Mathias & Taylor 3591, 6092* (F, UCLA); Prov. Mariscal Cáceres, Dto. Tocache Nuevo, quebrada de Santiago, al E de Puerto Pizana, *Schunke V. 6530* (GH, MO); Prov. Mariscal Cáceres, Dto. Tocache Nuevo, quebrada de Cachiyaca, afluente de la quebrada de Huaquista, al E de Puerto Pizana, *Schunke V. 8528* (F, MICH, MO).

Stigmaphyllon argenteum is named for the silvery pubescence on the abaxial leaf surfaces. It is distinguished by its small flowers, in which the petal limbs are only up to 7 mm in diameter and the anthers of stamens opposite the posterior-lateral sepals bear only one locule, and by its samaras, which lack lateral winglets. *Stigmaphyllon cardiophyllum* differs in its abundantly pubescent anthers and its leaves, which may be very sparsely sericeous below but most commonly are glabrate to glabrous. In *S. sinuatum*, the flowers are borne in pseudoracemes instead of umbels, the petals are usually larger (up to 13 mm in diameter), the stamens opposite the posterior-lateral sepals have unmodified anthers and are subequal to the stamen opposite the posterior petal, the styles are commonly pubescent (glabrous in *S. argenteum*), and the nut of the samara usually bears lateral winglets. *Stigmaphyllon convolvulifolium* and *S. argenteum* are not sympatric.

Stigmaphyllum cardiophyllum Adr. Juss., Ann. Sci. Nat. Bot., sér. 2, 13: 289. 1840.—

TYPE: "Brasilia borealis," collector unknown (holotype: P!, photos: F! MICH!, fragment: P-JU!). Fig. 2.

Vine to 15 m. Laminas 7.3–17 cm long, 3.7–13.5 cm wide, ovate to elliptical (the smaller often narrowly elliptical) to suborbicular, sometimes shallowly to deeply 2–3-lobed, apex acuminate to acuminate-caudate, base truncate to cordate or sometimes attenuate, especially in smaller laminas, very sparsely sericeous to glabrous above and below (trabecula 0.2–0.9 mm long, straight, sessile to sub-sessile), margin with irregularly spaced sessile glands (0.2–0.6 mm in diameter) and the bases of broken-off filiform glands, with a pair of prominent but sessile glands at the apex of the petiole, each gland 1.1–3 mm in diameter; petioles 2.7–8 cm long; stipules 0.5–1 mm long, 0.5–1.4 mm wide, eglandular. Flowers ca. 15–25 (–30) per umbel, these borne in dichasias or compound dichasias or small thyrses. Peduncles (1.5–) 2.2–5 mm long, pedicels 4–10 mm long; peduncles 0.3–1 times as long as the pedicels. Bracts 0.7–2 mm long, 0.5–0.8 mm wide, triangular or narrowly so; bracteoles 0.4–1 mm long, 0.4–0.8 mm wide, triangular, usually eglandular or sometimes each bracteole with a pair of inconspicuous glands (each ca. 0.1 mm in diameter). Sepals 1.2–2 mm long and wide, glands 1–1.8 mm long, 0.7–1 mm wide. All petals with the limbs glabrous, yellow; lateral petals with the limbs orbicular, margin erose; anterior-lateral petals: claw 1–1.8 (–2.1) mm long, limb (5–) 6–6.5 mm long and wide; posterior-lateral petals: claw 0.5–1 (–1.3) mm long, limb 4–5 mm long and wide; posterior petal: claw 2–2.5 mm long, apex indented, limb (3.2–) 3.5–4 mm long, (2.3–) 3–4 mm wide, broadly obovate to broadly elliptical to suborbicular, margin irregularly denticulate to denticulate-erose to sometimes erose. Stamens unequal, those opposite the posterior styles the largest but their filaments subequal to those of stamens opposite the anterior-lateral sepals, anthers of those opposite the lateral sepals with the connective enlarged and the locules reduced, those opposite the posterior-lateral sepals usually with only 1 tiny locule; anthers all loculate, pubescent. Anterior style 2–2.3 mm long, shorter than the posterior two, glabrous; apex 0.9–1.1 mm long; each foliole 0.5–0.8 mm long, 0.4–0.8 mm wide, triangular to square. Posterior styles 2.2–2.6 mm long, glabrous, lyrate; foliole 0.9–1.2 mm long, 0.8–1.4 mm wide, subsquare to subtrapezoidal. Dorsal wing of samara 2.7–4 cm long, 1.1–1.8 cm wide, upper margin with a blunt tooth; lateral winglets absent, nut only prominently ribbed; nut 4.1–5.5 mm high, 2.5–3.5 mm in diameter, areole 2.5–3.3 mm long, 2.1–2.5 mm wide, convex, carpophore up to 3 mm long. Embryo 4.5–6.4 mm long, ca. 2 times as long as wide, ovoid, outer cotyledon 4.2–5.9 mm long, 2.5–3.1 mm wide, straight, inner cotyledon 3.9–5.5 mm long, 1.8–2.8 mm wide, straight.

Phenology. Collected in flower from May through February, in fruit from June through April.

Distribution. Amazonian lowlands of Ecuador, Peru, Brazil, and Bolivia; along river banks in lowland and floodplain forest, at forest edge, and in secondary growth and capoeiras; sea level to 1600 m.

REPRESENTATIVE SPECIMENS. **Ecuador.** NAPO: Estación Biológica Jatun Sacha, 8 km al este de Misahualli, 01°04'S, 77°36'W, Cerón M. & Iguago 5592 (MICH); Río Napo, Puerto Napo, Harling 3518 (S); Misahualli, Steiner 275 (MICH).—PASTAZA: Puerto Sarayacu, Lugo S. 3899 (GB, MICH). **Peru.** AMAZONAS: Río Cenepa, vicinity of Humapimi, ca. 5 km E of Chávez Valdivia, ca. 04°30'S, 78°30'W, Ancuash 1134 (F, MICH, MO); Valle de Santiago, Quebrada Caterpiza, 03°50'S, 77°40'W, Tunqui 708 (MICH, MO); Aramango, Woytkowski 5629 (G, GH, MO, US).—CUZCO: Prov. Paucartambo, Atalaya, near junction of Río Carbón and Río Alto Madre de Dios, Foster 3041 (MICH).—

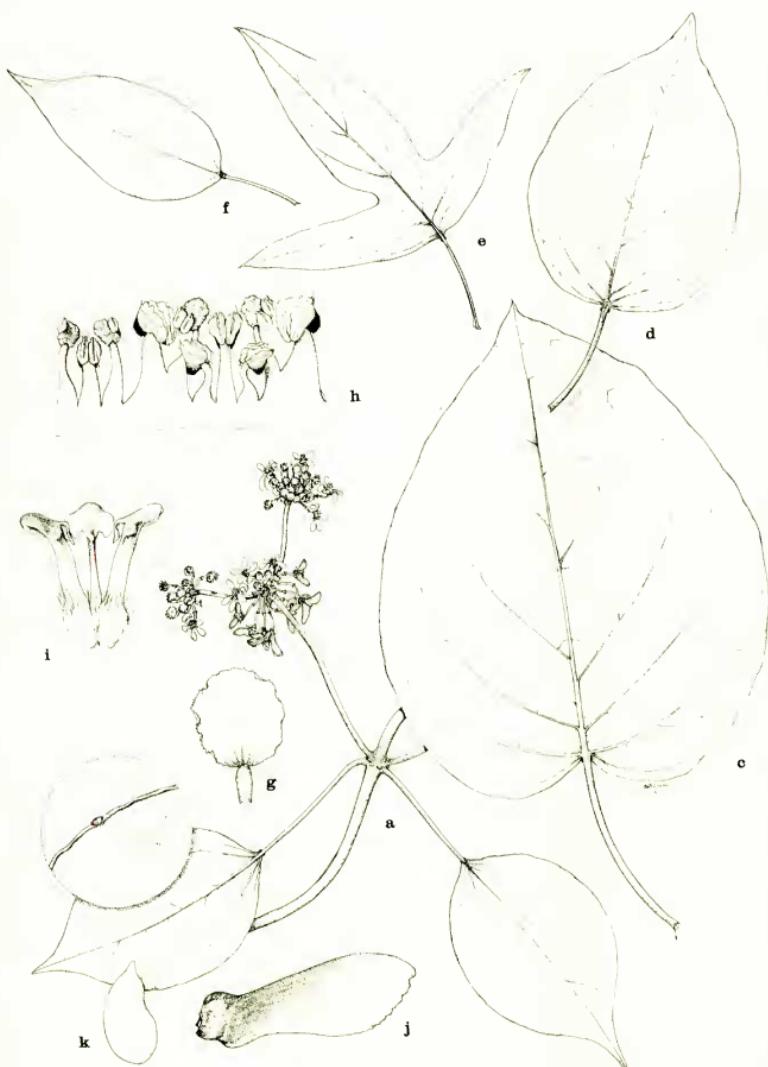


FIG. 2. *Stigmaphyllo cardiospathum*. a. Flowering branch ($\times 0.5$). b. Detail of abaxial leaf surface ($\times 5$). c-f. Leaves illustrating variation of laminar shape ($\times 0.5$). g. Posterior petal ($\times 2.5$). h. Androecium ($\times 10$), second stamen from left opposes posterior petal. i. Gynoecium ($\times 7.5$), anterior style at center. j. Samara ($\times 1$). k. Embryo ($\times 2.5$). (Based on: a, b, f-i, Encarnación 26052; c, Ancaush 1134; d, Woytkowski 5954; e, Nee 36821; j, k, Foster 6506.)

HUANUCO: Tingo María, *Asplund 12103* (S); Prov. Huánuco, Maranjillo, cerca a Tingo María, *Ferreyyra 2196* (MICH); 69 km NE of Tingo María on rd to Tocache, Huallaga Valley, ca. 09°S, 76°W. *Gentry et al. 37633* (MICH).—JUNÍN: Sani Beni, *Woytkowski 5954* (GH, MO, US); Mazamari, *Woytkowski 5979* (MO, US); San Ramón, *Woytkowski 7412* (GH, MO).—LORETO: Alto Amazonas, Dtto. Pastaza, Río Pastaza, *Ayala 2295* (AMAZ, MICH); Coronel Portillo, Tournavista, margen izquierda del Río Pachitea, *Encarnación 26052* (MO, NY); Prov. Coronel Portillo, Bosque Nacional de von Humboldt, Km 86, Pucallpa-Tingo María rd, 08°40'S, 75°00'W. *Gentry & Horner 29481* (AMAZ, MICH); Mishuyacu, near Iquitos, *Klug 160* (F, NY, US); Stromgebiet des Marañón von Iquitos aufwärts bis zur Santiago-Mündung am Pongo de Manseriche, 77°30'W. *Tessman 3966* (G, S); Prov. Maynas, Iquitos, Quistacocha, 03°48'S, 73°25'W. *Vásquez & Jaramillo 12072* (MICH).—MADRE DE DIOS: Prov. Tambopata, Lago Tres Chimbas, ca. 65 river km SSW of Puerto Maldonado, ca. 10–15 air km NW effluence Río La Torre (Río D'Orbigny)/Río Tambopata, 12°49'S, 69°17'W. *Barbour 5744* (MICH); Prov. Manu, Parque Nacional del Manu, Río Manu, Cocha Cashu Station, 11°50'S, 71°25'W. *Foster 6506* (F), 9704 (F, MICH); small tributary of Río Madre de Dios, 1 km below Puerto Maldonado, *Gentry et al. 19654* (F, MICH).—SAN MARTÍN: Prov. Mariscal Cáceres, entre Pólvora y Chio, valle Huallaga, *Ferreyyra 4464* (MICH, US); Prov. San Martín, cerca de Shapaja, *Ferreyyra 18273* (US); Tarapoto, *Ule 6438* (G, K, MG, NY); Pona to Saposoa, *Woytkowski 5442* (F, MO). **Brazil.** ACRE: 9 km from Río Branco on Río Branco-Porto Acre rd, *Lowrie 646* (INPA, MICH); Mpio. Serra Madureira, Rio Caeté, afluente do Río Iaco, *Raos et al. 643* (INPA); Río Juruá-Jurua Mirim, *Ule 5593* (G, MG).—AMAZONAS: Bóca do Acre, Purús, *Goeldi 3969* (MG); Tonantins (Soliomés), *Jobert 764* (P); Mpio. São Paulo de Olivença, near Palmares, *Krukoff 8291* (A, BR, F, G, LE, MICH, MO, NY, P, S, U).—MARANHÃO: between Viana and Banderante, ca. 03°00'S, 45°10'W. *Daly et al. 648* (NY); Alzilândia, Río Pindaré, 03°45'S, 46°05'W. *Jangoux & Bahia 321* (MICH).—PARÁ: Alenquer, Colônia Laura Sodré, Km 15. *Fróes 29378* (IAN); Ilha de Mosqueiro, near Pará, *Killip & Smith 30394* (NY); Rd BR-22, Capanema to Maranhão, Km 96, *Prance & Pennington 1824* (IAN, MICH, NY). **Bolivia.** BENI: Bopí River valley, *Rusby 385* (K, MICH, NY, US).—LA PAZ: Prov. Sud Yungas, Alto Beni, carretera entre Puente Sapeco y Santa Ana, *Seidel & Schulte 2301* (MICH); Prov. Nor Yungas, Alto Beni, camino del puente hacia San Antonio, *Seidel & Schulte 2320* (MICH).—PANDO: Prov. Manuripi, antes de Independencia, *Moraes 264* (MICH); Prov. Manuripi, along Río Madre de Dios, 80 km (by air) downstream from and W of Chibe, 11°54'S, 68°02'W. *Nee 31525* (MICH); Río Acre, im Walde bei Cobija, *Ule 9484* (G, K, MG).—SANTA CRUZ: Prov. Andrés Ibáñez, 12 km E of center of Santa Cruz on rd to Cotooca, 17°46'S, 63°04'W. *Nee 36821* (MICH).

Stigmaphyllo cardioviphyllo, a common species of the Amazonian lowlands, is readily recognized by its very sparsely sericeous to usually glabrous leaves, small flowers, and samaras. The laminas are mostly ovate to elliptical (the smaller narrowly so) and only sometimes cordate, as in the type. The limbs of the petals are only up to 6.5 mm in diameter. The anthers are pubescent, and those opposite the posterior-lateral sepals bear only one tiny locule (very rarely two). The samara lacks lateral ornamentation. This species may be confused with forms of *S. sinuatum* with abaxially very sparsely pubescent leaves, and, in eastern Brazil (Pará), with *S. convolvulifolium*, whose leaves are also very sparsely sericeous to glabrous below. Both differ in their larger flowers (limbs of the petals up to 15 mm in diameter), glabrous anthers (all with two locules), usually pubescent styles (glabrous in *S. cardioviphyllo*), and samaras that are usually laterally ornamented with winglets, crests, and/or spurs. For a separation from *S. argenteum*, see that species.

Several collections from Ecuador and one from Peru may represent hybrids between *S. cardioviphyllo* and an unknown species, possibly the sympatric *S. sinuatum*. They differ from typical specimens of *S. cardioviphyllo* in their leaves, anthers, posterior styles, and, sometimes, the samaras. The laminas are persistently sparsely sericeous below (the trabecula 0.3–0.5 mm long, sessile). The anthers are only sparsely pubescent or glabrous, and those of the posterior-lateral stamens may have two unequal locules. The posterior styles are sparsely pubescent in the proximal 1/3, and the nut of the samara may have a small lateral winglet or

spur. Pollen of these anomalous specimens is mostly composed of misshapen, heavy-walled grains. When placed in cotton blue in lactophenol, only 0–20% of the pollen is stained; the grains that do stain are of unequal size. The following collections are considered putative hybrids:

Ecuador. MORONA-SANTIAGO: alrededores del puente sobre el Río Bombioza, carretera Gualajiqua-Zamora cerca la Parroquia de Bombioza, *M. Baker* 6479 (MICH).—NAPO: Estación Biológica Jatun Sacha, 8 km al este de Misahualli, 01°04'S, 77°36'W, *Cerón M.* 2038 (MICH); Payamino, Reserva Florística "El Chuncho," 5 km al NW de Coca, 00°30'S, 77°01'W, *Cerón M.* & *Neill* 2367 (MICH); via Puerto Napo-Misahualli, *Jaramillo* 87 (AAU, NY, QCA); Rio Napo between Coca (Puerto Francisco de Orellana) and Armenia Vieja, *Harling & Andersson* 11977 (GB, MICH); Santa Rosa al Río Napo, *Lugo* 168, 1981, 2001, 2027 (GB, MICH); Misahualli al Río Napo, *Lugo* 2273 (GB, MICH).—ZAMORA-CHINCIAPI: near Méndez, *Camp E-853* (NY, US). **Peru.** AMAZONAS: Río Cenepa, vicinity of Huampami, ca. 5 km E of Chávez Valdívía, ca. 04°30'S, 78°30'W, *Ancuash* 1262 (F, MICH, MO).

The name *Stigmaphyllo* *cardiophyllum* has long been ignored, because most later botanists did not see Jussieu's type and found his description not definitive enough to assign this name with confidence. Collections of this species were often left undetermined, assigned to *S. convolvulifolium*, or labeled with one of the synonyms of *S. sinuatum*. Grisebach (1858) did recognize *S. cardiophyllum* and correctly listed a Spruce collection with heart-shaped leaves from Bentham's herbarium (*Spruce* 1644, K!); however, Niedenzu (1900) tentatively placed *S. cardiophyllum* in *S. salzmannii* Adr. Juss. Niedenzu later (1928) listed *S. cardiophyllum* as a separate species but only quoted Jussieu's description from the *Monographie* (1843) and cited Grisebach (1858). Macbride (1949) included *S. cardiophyllum* at the species level in his account of the Malpighiaceae of Peru. He noted that *Williams* 6883 was distributed as *S. cardiophyllum* [correctly identified, F!], but that it "is probably referable to *S. tiliaceum* or allied form." He cited other collections of *S. cardiophyllum* under other names, e.g., *Tessmann* 3412 (NY!) and 3966 (G! S!) as *S. convolvulifolium*, and *Klug* 160 (F! NY! US!) as *S. puberum*. Examination of the Amazonian sericeous-leaved species of *Stigmaphyllo* and comparison with Jussieu's type revealed the distinctive species to which the name *S. cardiophyllum* applies.

Stigmaphyllo convolvulifolium Adr. Juss., Ann. Sci. Nat. Bot., sér. 2, 13: 289. 1840.—TYPE: FRENCH GUIANA. Cayenne, *Martin* s.n. (lectotype, designated by C. Anderson, 1987: P!).

Stigmaphyllo latifolium Bentham, London J. Bot. 7: 128. 1848.—TYPE: SURINAME. *Hostmann* 146 (holotype: K-herb, Bentham!, photo: MICH!; isotypes: BM! G! K-herb, Hooker! NY-fragment! P! U! W!).

Vine to 15 m. Laminas 5–15 cm long, 4.5–11.5 cm wide, ovate to cordate or narrowly so, apex acuminate-mucronate, base cordate, very sparsely sericeous to soon glabrate or glabrous above, very sparsely and minutely sericeous (appearing glabrous to the naked eye) to glabrate to glabrous below [trabecula 0.1 (–0.2) mm long, straight, sessile], margin with irregularly spaced sessile glands (0.2–0.5 mm in diameter) and filiform glands (up to 1.6 mm long), with a pair of prominent but sessile glands at the base borne halfway on the petiole, each gland 1.1–2.6 mm in diameter; petioles 1.5–10 cm long; stipules 0.3–0.9 mm long, 0.5–1.3 mm wide, eglandular. Flowers ca. 15–40 per pseudoraceme, these borne in dichasias or compound dichasias or small thyrses. Peduncles 4–12.5 mm long, pedicels 3–9 mm

long; peduncles 0.7–2 times as long as the pedicels. Bracts 1–1.7 mm long, 0.8–1.2 mm wide, triangular; bracteoles 1–1.5 mm long, 0.7–1.3 mm wide, oblong to ovate, eglandular or each bracteole with a pair of inconspicuous glands (each 0.2–0.4 mm in diameter). Sepals 1.8–2.5 mm long and wide, glands 1.2–1.9 mm long, 0.7–1.2 mm wide. All petals with the limbs orbicular, glabrous, suffused with red, margin erose to denticulate-fimbriate, the teeth/fimbriae up to 0.2 mm long; anterior-lateral petals: claw (1.5–) 2–2.2 mm long, limb 11–12 mm long and wide; posterior-lateral petals: claw 1–1.5 (–1.7) mm long, limb 8–10 (–11) mm long and wide; posterior petal: claw (3.2–) 2.5–3.5 mm long, apex indented, limb 6–8.5 mm long and wide. Stamens unequal, those opposite the posterior styles the largest, anthers of those opposite the anterior-lateral sepals with the connective enlarged and the locules reduced or rarely with only 1 reduced locule or eloculate; anthers usually all loculate, glabrous. Anterior style 2.8–3.3 mm long, shorter than the posterior two, with scattered hairs in the proximal 1/3–1/2; apex 1.5–1.9 mm long sometimes including a spur ca. 0.2 mm long; folioles variable, the larger folioles 0.9–1.5 mm long, 0.7–1.5 mm wide, parabolic to broadly lunate to subrectangular, sometimes much smaller, ca. 0.6 mm long, ca. 1 mm wide, broadly triangular. Posterior styles 3.1–4 mm long, with scattered hairs in the proximal 1/4–3/4, lyrate; foliole 1.5–1.8 mm long, 1.6–2 mm wide, suborbicular to subsquare to trapezoidal. Dorsal wing of samara 3.4–4.2 cm long, 1.2–2 cm wide, upper margin with a blunt tooth; nut bearing a pair of rectangular to semicircular to lunate, entire to grossly dentate lateral winglets, these 3.5–6.5 mm long, 1.2–2 mm wide, and often also with a few spurs and crests up to 1.5 mm long and 1 mm wide; nut 4.5–6.7 mm high, 3.5–4.3 mm in diameter, areole 3.3–3.5 mm long, 2.8–3.5 mm wide, concave, carpophore up to 3 mm long. Embryo 6–6.7 mm long, ca. 2 times as long as wide, ovoid, outer cotyledon 9–10.2 mm long, ca. 3.3 mm wide, the distal 1/3 folded over the inner cotyledon, inner cotyledon 6.6–7.3 mm long, 2.8–3.1 mm wide, folded at the distal 1/4–1/3.

Phenology. Collected in flower and fruit throughout the year.

Distribution. In moist forest, along rivers, and also in secondary growth and along roadsides; Guyana, Suriname, French Guiana, and northeastern Brazil (Amapá and eastern Pará), also recorded from Martinique and Trinidad; sea level to 300 m.

REPRESENTATIVE SPECIMENS. **Martinique.** Marigot, Ste. Marie, *Duss* 1473 (NY); *Terrasson* s.n. in 1796 (P-JU). **Trinidad.** Maracas, *Broadway* 8052 (A, BM, MO, S); NE of Point Fortin, *Davidse* 2578 (F, GH, MO, NY).

Guyana. Northwest distr., Waini River, Marabo Creek, *de la Cruz* 1267 (NY, US); Pomeroon dist., Pomeroon River, *de la Cruz* 3044 (CM, F, GH, MO, NY, US); Kamakusa, upper Mazaruni River, ca. 59°50'W, *de la Cruz* 4149 (CM, F, GH, NY, US); margins of Berbice River, S of New Dageraad, ca. 06°N, 57°43'W, *Maas* et al. 5543 (MICH); Essequibo, *Meyer* s.n. (GOET). **Suriname.** Fluv. Coppenname, Boon 1048, 1104 (U); Wilhelmina Gebergte, Lucie River, 03°20'N, 56°49'W, *Irwin* et al. 55408 (F, K, MICH, NY, U, US), *Irwin* et al. 55463 (C, F, K, MICH, MO, NY, RB, U); Paramaribo, *Kramer* & *Hekking* 2338 (U); ad ripas fluv. Marowijne, *Lanjouw* & *Lindeman* 2962 (NY, U); Jandé kreek, boven Suriname rivier, 1 1/2 uur varen beneden Kabel, *Lindeman* 4455 (MO, U); Jodensavanne-Mapane kreek area, Suriname River, *Lindeman* 5001 (U); Perica River, *Lindeman* 5440 (COL, MICH); Saramacca River, rear of village Jacob kondre, *Maguire* 23847 (F, GH, K, MO, NY, RB, U, US); fluv. Gonini, *Versteg* 47 (U). **French Guiana.** Haut. Riv. Mana, amont de Sant Ananas, *Cremers* 7531 (CAY, MICH); S de St. Jean du Maroni, *Cremers* 7672 (CAY, MICH); route de St. Laurent à Paul Isnard entre les PK 10 et 40, *Cremers* 7979 (CAY, MICH); fleuve Tampoc, à 4 km en amont de son confluent avec l'Ouaqui, *Granville* B4834 (MICH, P); RN2, à proximité du pont sur l'Orapu, *Granville* 5036 (CAY, MICH); Crique Cabaret-Bassin de l'Oyapock, entre l'embouchure et la crique Mérignan, 03°55'N, 51°48'W, *Granville* 10235 (MICH); Trois Sauts,

Akattis Alasuka, *Haxaire 566* (CAY); Comté, entre Rodre Fondé et Belizón, *Oldeman 1449* (MICH); Haut Oyapock, environ 2500 avant l'embouchure de la rivière Eurupoucigne, *Oldeman B3289* (MICH); entre Cabassou et Degrad des Cannes, Île de Cayenne, *Prévote 1257* (CAY, MICH); rivière Inini, affluent du Moyen-Maroni (Lawa), en amont de Maripasoula, *Sastre et al. 3996* (CAY, MICH, P); Sinnamary, route de Ste. Elie, Km 17, *Sastre et al. 4199* (MICH, P); fleuve Approuague, près de Régina, *Sastre 4813* (CAY, MICH); montagnes de Kaw, auberge de Brousse des Cascades, 04°35'N, 52°17'W, *Weitzman 272* (MICH). **Brazil.** **PARÁ:** Obidos, Rio Paru de Oeste, *Cavalcante 801* (MG); Gurupá, Rio Amazon, *Killip & Smith 30594* (NY); Jari, estrada do Munguba, N. T. *Silva 2138* (IAN, MICH).—**AMAPÁ:** Rio Amapari, Serra do Navio, *Cowan 38206* (MICH, NY); Rio Jari, 0.5–3 km S of Santo Antonio da Cachoeira, 00°55'S, 52°55'W, *Egler & Irwin 46066* (MICH, NY, UB); confluence of Rio Jari with Rio Oiapoque, 02°53'N, 52°22'W, *Egler & Pires 47771* (MICH, NY); Mpio. Mazagão, BR-156, 81 km WSW of Macapá, ca. 11 km SW of Rio Preto, 00°08'S, 51°48'W, *Mori & Cardoso 17432* (MICH); Mpio. Calçoene, BR-156, 53–72 km WSW of Calçoene, ca. 02°33–38'N, 51°16'W, *Rabelo et al. 2964* (MICH); Rio Araguari, between 01°02'N, 51°45'W and 00°57'N, 51°29'W, *Pires et al. 50907* (IAN, MG, MICH, NY); between Rios Cujubim and Flechal, 01°45'N, 50°58'W, *Pires & Cavalcante 52435* (IAN, MG, MICH, NY).

Stigmaphyllo convolvulifolium is distinguished by its ovate to cordate leaves, whose lower surfaces are glabrate to glabrous but often very sparsely and minutely sericeous below (appearing glabrous to the naked eye); the sessile hairs are only 0.1 (–0.2) mm long. Only the stamens opposite the anterior-lateral sepals have enlarged connectives and reduced locules, and the styles are pubescent in the basal 1/4–3/4. The petals, especially the flag, are usually suffused with red. This species is most likely to be confused with the widely distributed and extremely variable *S. sinuatum* and in eastern Brazil (Pará) with *S. cardiophyllum* (see that species); *S. convolvulifolium* and *S. argenteum* are not sympatric. *Stigmaphyllo convolvulifolium* and *S. sinuatum* are similar in many aspects but can always be separated by the nature of the pubescence on the abaxial leaf surface. In the range of *S. convolvulifolium*, the common form of *S. sinuatum* has the leaves densely silver-sericeous below. A variant in French Guiana and in Amazonian Brazil has the leaves less abundantly pubescent abaxially though never as sparsely as in *S. convolvulifolium*; the hairs are (0.2–) 0.3–0.5 (–0.7) mm long.

The epithet “convolvulifolium” is often ascribed to Cavanilles, who published *Banisteria convolvulifolia* in 1790; however, Cavanilles cited Linnaeus's earlier *Banisteria dichotoma* [= *Stigmaphyllo dichotomum* (L.) Griseb.] in synonymy. Jussieu (1840) intended to make the combination in *Stigmaphyllo*, but because Cavanilles's name was superfluous, the name *Stigmaphyllo convolvulifolium* dates from Jussieu's publication. The lectotype is a Martin collection, annotated by Jussieu, that matches Jussieu's description.

***Stigmaphyllo sinuatum* (DC.) Adr. Juss., Ann. Sci. Nat. Bot., sér. 2, 13: 288.**

1840. *Banisteria sinuata* DC., Prodr. 1: 588. 1824. *Stigmaphyllo hastatum* var. β *sinuatum* (DC.) Nied., Ind. Lect. Lyc. Brunsberg, p. aest. 1900: 24. 1900. *Stigmaphyllo sagittatum* var. β *sinuatum* (DC.) Nied., Pflanzenreich IV, 141(2): 506. 1928.—TYPE: FRENCH GUIANA. *Perrotet s.n.* (holotype: G-DCL, microfiche: MICH!, photos: F! GH! MICH! NY!). Fig. 3.

Banisteria heterophylla Willdenow, Sp. pl. 2: 742. 1799, non *Stigmaphyllo heterophyllum* Hooker, 1843. *Banisteria splendens* DC., Prodr. 1: 588. 1824, nom. superfl. *Stigmaphyllo fulgens* Adr. Juss., Ann. Sci. Nat. Bot., sér. 2, 13: 289. 1840, nom. superfl. *Stigmaphyllo splendens* Cuatr., Webbia 13: 531. 1958, nom. superfl.—TYPE: VENEZUELA. “ad Orinocum,” *Bredemeyer s.n.* (holotype: B-W 8855, microfiche: MICH!).

Stigmaphyllum martianum Adr. Juss., Ann. Sci. Nat. Bot., sér. 2, 13: 289. 1840.—
TYPE: BRAZIL. Amazônas: "in sylvis Japurensibus," Dec, *Martius s.n.* (holotype: M!, photos: F! GH! MICH! NY!).

Stigmaphyllum richardianum Adr. Juss., Ann. Sci. Nat. Bot., sér. 2, 13: 289. 1840.—
TYPE: FRENCH GUIANA. Cayenne, July, *Richard s.n.* (holotype: P!, fragment: P-JU!, photos: F! MICH!).

Stigmaphyllum hypoleucum Miquel, Linnaea 18: 51. 1844.—TYPE: SURINAME.
"ad fluv. Boven Cottica, in sylva," Oct 1842, *Focke 683* (holotype: U!).

Stigmaphyllum purpureum Bentham, London J. Bot. 7: 128. 1848.—TYPE: GUY-
ANA. Picarara, *Robt. Schomburgk, 1st coll.* 737 (holotype: K!, photo: MICH!;
isotypes: G! P! W!).

Stigmaphyllum brachiatum Triana & Planchon, Fl. Novo-Gran. in Ann. Sci.
Soc. Nat. Bot., sér. 4, 18: 316. 1842.—TYPE: COLOMBIA. Meta: Villavicencio,
450 m, *Triana s.n.* (holotype: P!, photos: F! GH! MICH! MO!; iso-
types: COL! G!).

Stigmaphyllum monancistrum Niedenzu, Ind. Lect. Lyc. Brunsberg. p. hiem.
1899-1900: 9. 1899.—TYPE: "Colombia" [VENEZUELA]. Aragua: Maracay,
ad rivulis in crepidis, *Moritz* 779 (lectotype, here designated: LE!; frag-
ment of B duplicate: NY!).

Vine to 30 m. Laminas 6-21 cm long, 4.5-20 cm wide, triangular to ovate to
cordate to elliptical to broadly so to orbicular to oblate to reniform, apex mucronate
to emarginate-mucronate to short-acuminate, base acute to truncate to cordate to
deeply auriculate, very sparsely sericeous to glabrous above, sparsely sericeous to
densely silver-sericeous below [trabecula (0.2-) 0.3-0.5 (-0.7) mm long, straight,
mostly sessile but sometimes with a tiny stalk up to 0.1 mm long, especially if
vesture is very dense], margin grossly and shallowly crenate to subentire and with
irregularly spaced sessile glands (0.4-1.5 mm in diameter) at the sinuses and
sometimes also with filiform glands (up to 1.5 mm long), with a pair of prominent
but sessile glands at the apex of the petiole, each gland 1-3.5 mm in diameter;
petioles 1.8-13 cm long; stipules 0.5-1.3 mm long, 0.5-1.5 mm wide, eglandular.
Flowers ca. 15-35 (-40) per pseudoraceme, these sometimes interrupted, borne in
compound dichasia or small thyrses. Peduncles 1.5-11 mm long, pedicels 3-9.5
mm long; peduncles 0.4-1.5 times as long as the pedicels. Bracts 0.7-2 mm long,
0.5-1.4 mm wide, triangular or narrowly so; bracteoles 0.9-1.6 mm long, 0.7-1.3
mm wide, triangular to parabolic to ovate, eglandular or more commonly each
bracteole with a pair of inconspicuous glands (each 0.1-0.5 mm in diameter) or
sometimes only with a glandular area in the basal 1/3-1/2. Sepals 1.5-2.5 (-3) mm
long, 1.5-2.5 (-3) mm wide, glands (1-) 1.2-2.2 mm long, 0.8-1.3 mm wide. All
petals glabrous or sometimes pubescent abaxially, yellow or suffused with red,
margin erose to erose-denticulate to denticulate, teeth up to 0.3 mm long, lateral
petals with the limbs orbicular; anterior-lateral petals: claw (1-) 1.5-2.5 mm long,
limb (8-) 10-15 mm long and wide; posterior-lateral petals: claw (0.5-) 0.8-2 mm
long, limb (7-) 9-13 mm long and wide; posterior petal: claw 2.6-3.5 (-4) mm
long, apex indented, limb (5-) 7-11 mm long and wide, broadly elliptical to broadly
obovate to orbicular. Stamens unequal, those opposite the anterior style and/or
the posterior styles the largest, anthers of those opposite the anterior-lateral
sepals with the connective enlarged and the locules reduced or sometimes with
only 1 locule or rarely eloculate; anthers glabrous. Anterior style (2.6-) 3.2-4 (-4.8)

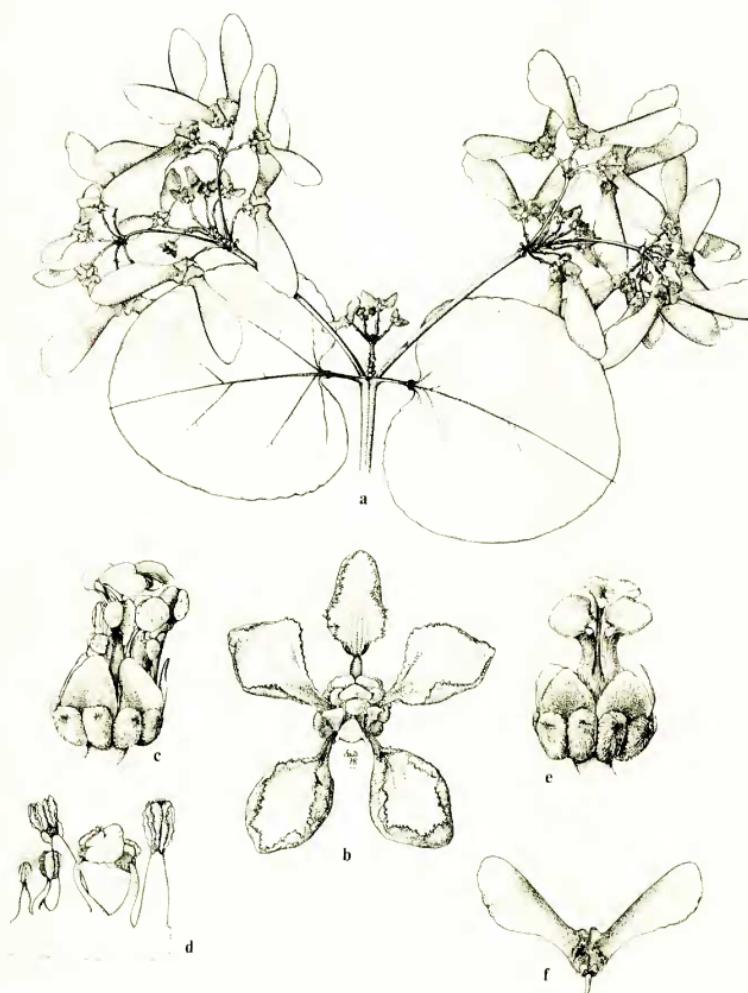


FIG. 3. *Stigmaphyllon sinuatum*. a. Fruiting branch ($\times 0.5$). b. Flower ($\times 2.5$). c. Flower with petals removed ($\times 5$); anterior sepal at right. d. Portion of androecium ($\times 5$); stamen at left opposite posterior petal. e. Flower with petals and androecium removed ($\times 5$); anterior style in center. f. Fruit with two samaras ($\times 0.75$). (Based on Wurdack 34434.)

mm long, shorter than or subequal to the posterior two, glabrous or commonly with a row of hairs adaxially in the proximal 1/5–2/3; apex (1.1–) 1.4–2.6 mm long, often including a spur 0.1–0.5 mm long, each foliole 0.7–1.9 mm long, 0.6–1.9 (–2.1) mm wide, triangular to parabolic to subrectangular or folioles absent and the apex extended into a claw 0.7–1.3 mm long. Posterior styles (2.8–) 3–4.5 (–5.2) mm long, glabrous or commonly with a row of hairs adaxially in the proximal 1/4–1/2, lyrate; foliole 1–2.2 mm long, (0.8–) 1.2–2.3 mm wide, subsquare to suborbicular or sometimes parabolic or rectangular. Dorsal wing of samara 3.5–5.5 cm long, 1–1.8 cm wide, upper margin with a blunt tooth; nut smooth or bearing 1–3 subentire to coarsely toothed to lacerate lateral winglets, these up to 6 mm long and 3.5 mm wide, and/or spurs and crests up to ca. 2 mm long and wide; nut 4.5–7 mm high, 2.8–4.4 mm in diameter, areole 2.3–4 mm long, 2.5–4.5 mm wide, concave, carpophore up to 5 mm long. Embryo 5.1–6.8 mm long, ca. 1.5–2 times as long as wide, ovoid, outer cotyledon (4.7–) 5.4–8.5 mm long, 2.5–4.2 mm wide, straight or the distal 1/5–3/5 folded over the inner cotyledon, inner cotyledon 4–6.3 mm long, 2.2–4 mm wide, straight or folded at the distal 1/4–2/3.

Phenology. Collected in flower and fruit throughout the year.

Distribution. Common in the lowlands of Colombia, Venezuela, the Guianas, northern Brazil, Ecuador, northern Peru, and Amazonian Bolivia; in primary and secondary forest, especially wet forest but also in white sand vegetation, along rivers, at roadsides, in thickets; sea level to 1000 m.

REPRESENTATIVE SPECIMENS (anterior style foliolate). **Colombia:** AMAZONAS: ca. 6 km W of Leticia at Santa Isabella, 04°10'S, 69°58'W, *Gillet & Dickenson* 16521 (COL, MO); Araracuara, near Río Caquetá, *Maguire et al.* 44142 (MICH, NY); Leticia, ca. 1 km NE of town, *Plowman et al.* 2291 (ECON, F, GH, NY); Leticia, *Schultes* 8222 (COL, GH). **Venezuela.** AMAZONAS: Dept. Río Negro, along Río Marawinuma, vicinity of Cerro de la Nebulina base camp, ca. 00°50'N, 66°09'W, *Liesner* 15966 (MICH); *Nee* 30880 (MICH); Tamatama, *Ll. Williams* 15217 (F, NY, US), *Wurdack & Adderley* 43641 (F, MICH, NY, U).—ANZOÁTEGUI: along Río Querecual, SW of Bergantín, *Steyermark* 61506 (F, NY, VEN).—ARAGUA: Rancho Grande, *Badillo* 1793 (MY).—BARINAS: Allamira, *Curran* M-619 (NY).—BOLÍVAR: NE de Canaima, S de Cerro Venado, ca. 06°16'N, 62°46'W, *Agostini* 299 (US); Ciudad Bolívar, Maquanta River, ca. 08°10'N, *Bailey & Bailey* 1411 (A, NY); Calzeta en la Botella, Río Cuyuni, *Bernardi* 6497 (MER, NY); a 48 km NE del caserío Los Rosos, este último a 17 km de Upata, sobre la carretera nueva Upata-San Félix, *Blanco* 434 (MER, MO, NY, US); dist. Cedeno, 6 km from Maniapure toward Caicara, 06°55'N, 66°30'W, *Boom & Grillo* 6487 (MICH); Mpio. Raúl León, Río Paragua, 04°18'N, 62°05'W, *Delgado* 104 (MICH); Km 105–112 de la carretera El Dorado-Sta. Elena, *Morillo et al.* 2932 (MICH); Mpio. Piar, camino desde El Plomo a Sta. Barbara, 06°45'30"N, 62°48'W, *Picón Nava* 1588 (MICH); Uruyén, Auyantepui, *Schnee* 1437 (MY); alrededores de Tumeremo, camino Tumeremo-Bochinche, entre Puesto (GN) Corumo y Caño Matuco del Río Negro, *Stergios et al.* 3563 (MICH); Sierra Imataca, along Río Reforma, 1 km above junction with Río Toro, *Steyermark* 87917 (MICH, NY, U, US); acercándose a las cabeceras del Río Nichare (affluente del Río Caura) en la dirección de la Sierra Maignalida y Sierra Cervatana, arriba de la desembocadura con el Río Cieuta (Icuta), 06°15'N, 65°05'W, *Steyermark & Gibson* 95736 (NY, US); La Prisión, Medio Caura, *Ll. Williams* 11539a (F); El Palmar, *Ll. Williams* 12919 (A, F, K, S); along Fundación rd, *Wurdack* 34434 (NY).—DELTA AMACURO: near border (=Río Grande o Toro) between Estado Bolívar and Terr. Delta Amacuro, ca. 08°04'N, 61°44'W, *Breteler* 3757 (MER, VEN, NY, U, US); Depto. Tucupita, ca. 13 km by rd ESE of the town of Sierra Imata, 08°32'N, 62°23'W, *Davidse & González* 16623 (MICH, MO); downstream from San Victor, Río Amacuro, Sierra Imataca, *Steyermark* 87299 (G, NY, P).—MIRANDA: dist. Pacz, Cerro Riberón between Río Guapo and Río Chiquito, 44.5 km (str. line) SE of Caucagua, 10°05'N, 66°01'W, *Davidse & González* 13604 (VEN); between La Cortada and Turumo Bridge, *Pittier* 11484 (G, K, NY, US, VEN); Los Mariches, *Pittier* 12991 (F, G, M, MO, NY, US, VEN); Cerros del Bachilla, between Quebradas Corozal and Santa Cruz, S of Santa Cruz, 10 km by air W of Cúpira, *Steyermark & Davidse* 116443 (MICH, MO).—MONAGAS: ca. 8 km ESE of Jusepín, *Pursell et al.* 9098 (NY, US, VEN).—SUCRE: Río Tatracual, 25 km outside Cumaná on Cumanacoa rd, *Sobel & Strudwick* 2274 (MICH). **Guyana.**

Near Mazaruni Forest Station, *Archer* 2463 (GH, K, US); Pomeroon Dist., Waramuri Mission, Moruka River, *de la Cruz* 2578 (GH, NY, US); Waini River, NW Dist., 08°20'N, 59°40'W, *de la Cruz* 3619 (F, GH, MO, NY, US); upper Demerara-Berbice region, ca. 27 km from Ituni along Ituni-Kwakwanni rd, 05°22'N, 58°07'W, *Gillespie* 2991 (MICH); Potaro-Siparuni region, trail from Kato to Paramakatoi, 04°41'N, 59°50'W, *Hahn* 5622 (MICH); Akyina, Demerara River above Wismar, 05°09'N, *Hitchcock* 17414 (GH, NY, US, S); Kanuku Mts, Rupununi River, near "the farm" of the Captain of Sandeck, 03°07'N, 59°26'W, *Jansen-Jacobs* et al. 206 (MICH); Gunn's, Essequibo River, 01°39'N, 56°38'W, *Jansen-Jacobs* et al. 1516 (MICH); Potaro-Siparuni region, Chenapou, 50 km upstream from Kaieteur Falls, 05°00'N, 59°34'W, *Kivist* 325 (MICH); Cuyuni-Mazaruni region, NW of Conoch Tipu, 05°48'N, 61°03'W, *McDowell* 2629 (MICH); Cuyuni River, by portage rd near lower Camaria Landing, *Sandwith* 664 (K, NY, U); Essequibo River, near mouth of Orono Creek, ca. 01°35'N, A. C. *Smith* 2821 (A, F, G, K, MO, NY, P, S, U); W extremity of Kanuku Mts, drainage of Takutu River, A. C. *Smith* 3166 (F, G, K, MO, NY, P, S, U, W); ca. 5 km SW of Mabura Hill towards Essequibo River, 05°19'N, 58°38'W, *Stoffers* et al. 35 (MICH); Marudi Mts, Mazoa Hill, near NorMan Mines camp, 02°15'N, 59°10'W, *Stoffers* et al. 207 (MICH). **Suriname**. *Scotweg*, *Archer* 2658 (US); *Zandrij*, *Archer* 2761 (US); *Republieck, van Doesburg, Jr.*, 70 (U); dist. Saramacca, Experimental Farm Coebiti, *Everaarts* 519 (MICH); in montibus Bakhuis inter flum. Kabalebo et Coppename sinistrum, around Kabalebo airstrip, *Florschütz & Maas* 2502 (F, U); dist. Nickerie, area of Kabalebo Dam project, ca. 22 km SW of Avanavero damsite, *Heyde* & *Lindeman* 103 (MICH, U); without locality, *Hostmann* 1029 (BM, G, GH, P, U, W); Wilhelmina Gebergte, Zuid River, 45 km above confluence with Lucie River, 03°10–20 N, 56°29–49'W, *Irwin* et al. 57631 (K, MG, MICH, NY, S, U, US); Suriname River near Kabelstation, *Lanjouw* 11185 (U); Nickerie Dist., area of Kabalebo Dam project, 04–05°N, 57°30–58°W, *Lindeman* et al. 47 (U); Lely Mts, SW plateaus, *Lindeman* et al. 266 (NY, U); Wajimbo River, *Linder* 89 (GH, NY); vicinity of Sectie O, KM 68, *Maguire & Stahel* 25000 (BR, F, G, GH, K, MO, NY, P, RB, U); Brownsberg Nature Park, 90 km S of Paramaribo, Mazaroni plateau, trail to Witti-creek, *Mori & Bolten* 8397 (MICH, NY); surroundings of Blakawatra, camp 8, 60 km SE of Paramaribo, *den Outer* 872 (U); fluv. Saramacca inf. prop. *Mindrinetti*, *Pulle* 34 (U); Jodensavanne-Mapankreek area (Surinam R.), *Schulz* 7313 (AAU, COL, MICH, NY, U, US). **French Guiana**. Sinnamary, piste de Ste. Elie, Km 15, *Billiet & Jadin* 1101 (BM, BR, CAY, NY); piste Saint Laurent vers Paul Isnard, entre Km 30 et 40, *Billiet & Jadin* 1577 (CAY, MICH); piste forestière allant de la route N2 vers Nancibio, *Billiet & Jadin* 1845 (CAY); le long de la piste de la route de Cayenne à Régina, ca. 30 km de Régina, *Cremer* 5991 (MICH); Bourg d'Apatou, Bassin du Maroni, 05°09'N, 54°20'W, *Fleurly* 334 (MICH); Haut Oyapock, Trois Sauts, *Garnier* 103 (CAY); Haut Oyapock, à 2 km env. en amont de Saut Boko, *Granville* 2465 (NY); Haute Camopi, Mont Belvédère, *Granville* 7010 (CAY, MICH); roche plate Roche Kooutou-Bassin Haut-Marounini, 1 km W de la Roche, 02°53'N, 54°04'W, *Granville* 9516 (MICH); St. Georges de l'Oyapock, piste de Maripa, *Grenand* 2136 (CAY, MICH); île de Cayenne, Mont Bachrel, 04°55'N, 52°19'W, *Hoff* 5224 (MICH, P); village de Zidockville, Trois Sauts, *Jacquemin* 1610 (CAY, MICH); Saül, 03°37'N, 53°12'W, *Marshall & Rombold* 169 (CAY, MICH); Maripasoula, *Oldeman* 1647 (MICH); rivière Tonégrande, près de port Inini, *Oldeman* 1656 (MICH, P); Saül, *Oldeman* 1982 (CAY, MICH, P); fleuve Approuague, rivière Arataye, Sauts Pararé, *Poncy* 221 (CAY); Acarouani, *Sagot* 91 (BM, G, P, S, W); St. Laurent region, ca. 5 km from Rte D9 at Charvein, 05°51'N, 53°51'W, *Skog & Feullet* 7481 (CAY, NY, P); main rd through Montagne de Kaw, 04°35'N, 52°15'W, *Weitzman* 308 (MICH). **Brazil**. ACRE: Cruzeiro do Sul, Projeto RADAM/BRASIL, aeroporto, *Monteiro & Damiao* 209 (INPA, MG), *Ramos* 116 (INPA), *Ramos & Mota* 208 (INPA); near Sta. Lucia, Km 40 on Transamazônica Hwy, E of Cruzeiro do Sul, 07°08'N, 72°33'W, *Pruski* 3498 (MICH).—AMAPÁ: 2–10 km N of Ferreira Gomes, BR-156, *Austin* 7257 (MICH); Rio Amapari, rd to Porto Terezinha, *Cowan* 38466 (K, NY, RB), *Cowan* 38473B (NY); Rio Amapá, Serra do Navio, lower slopes of Fritz Akerman Ore Body, *Cowan & Maguire* 38086 (COL, G, GH, MICH, MO, NY, P, S, U, W); Rio Oiapoque, 6 km SE of Clevelandia, 03°48'N, 51°53'W, *Irwin* et al. 47382 (IAN, MICH, NY); Mpio. Oiapoque, BR-156, 60 km SSE of Oiapoque, 03°18'N, 51°39'W, *Mori & Cardoso* 17134 (MICH); Macapá, Igarapé do Lago, *Rabelo & Non* 771 (MG); Matapi, Ribeiro 1597 (INPA, MICH, MO, NY, RB).—AMAZÔNIA: Mpio. Tefé, Rio Solimões, vila Nogueira, *Amaral* et al. 95 (INPA, NY); Manaus-Pôrto Velho hwy, Km 124, *Campbell* et al. P20920 (INPA, MICH, MO, NY, S, U); Manaus, Igarapé do Parque 10, *Chagas* INPA 3679 (INPA, SP); Rio Uatumá, Mpio. Itapiranga, *Cid* et al. 592 (INPA, MICH); BR-172, Manaus-Caracaraí, Km 97, *Cid* et al. 945 (INPA, MICH); Mpio. Maraá, Rio Japurá, affluent of Rio Solimões, *Cid & Lima* 3434 (INPA, MG, MICH); BR-307, Mpio. Cruzeiro do Sul, 7–8°S, 72–73°W, *Cid Ferreira* et al. 5218 (INPA, MICH); Mpio. São Paulo de Olivença, 6 km S of town center, 03°30'S, 68°57'W, *Daly* et al. 4442 (MICH); Barcelos, *Duarte* 7160 (INPA, RB, SP); Manaus, estrada do Mindú, *Ducke* 856 (F, IAN, MG, MO, NY, R, RB, US); Mpio. Maués, ca. 20 km E of Maués, Antarctica Guaraná Planta-

tion, *Hill et al.* 13152 (JBSD, MICH, TEX); Manaus, Rua Duque de Caxias, *Maas & Maas* 362 (INPA, U); caatinga do Porto Camanaus, *Madison et al.* PFE 414 (INPA); basin of Rio Demeni, vicinity of Tototobí, *Prance et al.* 10355 (INPA, MG, MICH, NY, U); Manaus, INPA, estrada do Aleixa, Km 3, *Prance & Ramos* 20922 (INPA, MICH, MO, NY, U); vic. of Pico Rondon, Perimental Norte, Km 211–220, 01°32'N, 62°48'W, *Prance et al.* 28821 (MICH), *Rodrigues et al.* 10584 (MICH); Santo Antonio do Iça, p. Vila Militar, *M. Silva* 2112 (MG); Fonte Boa, *M. Silva* 2183 (MG); Barra [=Manaus], *Spruce* 1880 (G, GH, LE, M, MG); Mpio. Humaitá, estrada Humaitá-Lábrea, Km 59, a 3 km ao N, *Teixeira et al.* 980 (INPA, MICH); Mpio. Humaitá, estrada Humaitá-Jacarecanga, Km 150, a 63 km ao S, *Teixeira et al.* 1340 (INPA, MICH).—MARANHÃO: Mpio. Monção, basin of the Rio Turiáu, Káapor Indian Reserve, *Balé* 886 (NY); ca. 50 km from Santa Luzia on Hwy to Aqáilândia, 04°05'S, 45°57'W, *Daly et al.* D736 (MICH); Rio Alto Turiáu, Barranquinha, 03°00'S, 45°45'W, *Jangoux & Bahia* 161 (MG, NY); margem do Rio Cururupu, *Lisboa* 47 (RB, SP); Km 375–380 da rodovia Belém-Brasília, *Oliveira* 1072 (IAN, UB).—PARÁ: Belterra, *Black* 47-1660 (IAN); Altamira, Km 74 da estrada Transamazônica Itaituba, *Cavalcante & M. Silva* 2780 (MG); Mpio. Oriximiná, Rio Trombetas, Lago de Matens, 19 km S de Pôrto Trombetas, *Cid et al.* 1793 (INPA, MG, MICH); Jacaracá Island, *da Costa* 149 (F); ca. 70 km from Tucuruí, ca. 04°11'S, 49°04'W, *Daly et al.* 1435 (INPA, MICH); boca do Lago de Faro, *Ducke* 88677 (MG); 4–5 km W of São Francisco do Pará toward Castanhal, *Gentry* 13166 (INPA, MICH, MO, NY); dist. Acará, Thomé Assú, Pau Vermelho, *Mexia* 5926 (A, F, G, GB, GH, MICH, MO, NY, S, U, WIS); Belém, horta do IAN, *Murça Pires & Black* 403 (GH); Mpio. Almeirim, Monte Dourado, estrada MTD, W em direção à mina de bauxita, *Murça Pires et al.* 620 (MICH); BR-163, Km 1131, Ciubá-Santarém highway, vicinity of Igarapé Natal, *Prance* P25427 (MG, MICH); Belém, terreno da EMBRAPA, *Ramos & Rosário* 14 (MG); Ourém, *Rodrigues* 4024 (MG); Tucuruí, margem direita do Rio Tocantins, *Rosário* 93 (MG, NY); Mpio. Almeirim, Monte Dourado, *Santos* 437 (NY); Santarém, Km 70 da estrada do Palhão, arredores do Acampamento do Igarapé Guaraná, *M. Silva & R. Souza* 2522 (MICH, NY, U), *M. Silva & R. Souza* 2522 (CAS, CM, MG, MICH, NY); 7–11 km NW of AMZA camp 3-Alfa on rd to camp 4-Alfa, 05°47'S, 50°34'W, *Sperling* 6057 (MICH); Santarém, *Spruce* 767 (G, GH, GOET, M, NY, W); Macaua airstrip, 1 1/2 hrs upstream from Lageira airstrip, 05°55'S, 54°26'W, *Strudwick & Sobel* 3474 (MICH); Taperinha bei Santarém, *Zerny* 589 (W).—RONDÔNIA: Pôrto Velho-Cuiabá hwy, 25 km S of Nova Vida, *Forero & Wrigley* 7084 (INPA, MG, MICH, NY); basin of the Rio Madeira, cerrado between Jaciparaná and Rio Madeira, *Prance et al.* 5180 (INPA, MG, MICH, NY); Km 166–169, Madeira-Mamoré railroad near Mutumparaná, *Prance et al.* 5690 (INPA, MG, MICH, NY); foothills of Serra dos Pacaás Novos, 12 km NNE of Guaporé-Mirim, *Prance et al.* 6658 (F, INPA, MICH, NY); Pôrto Velho-Cuiabá hwy, vicinity of Santa Barbara, 15 km E of Km 117, *Ramos & Prance* 6905 (INPA, MICH, NY); Pôrto Velho, Represa Samuel, 08°55'S, 63°16'W, *Thomas et al.* 4949, 5034 (MICH).—RORAIMA: Aritumá region, on an azimuth of 011° from Boa Vista at a distance of 210 km, *Coradin & Cordeiro* 943 (INPA, MICH, NY); SEMA Ecological Reserve, Ilha da Maracá, 03°21'N, 61°27'W, *Milliken* M792 (MICH); Canto Galo, Rio Mucajai, between Pratinha and Rio Apiaú, *Prance et al.* 3964 (INPA, MG, MICH, NY, U); Serra Tepequem, *Prance et al.* 4437 (INPA, MG, MICH, NY, U); vicinity of Uaicá airstrip, Rio Uraricocira, 03°33'N, 63°11'W, *Prance et al.* 10909 (INPA, MG, MICH, NY, U); Mpio. Caracaraí, estrada Manaus-Caracaraí, Km 529–550, *dos Santos & Coelho* 700 (INPA, MICH); estrada Manaus-Caracaraí, BR-174, Km 329, army post N of Waimari-Ataori Indian Reserve, *Steward et al.* 9 (MICH); Rio Surumu, an cinem Baché der Serra do Mel, *Ule* 8185 (MG).—BOLIVIA: BENI: Vaca Diez, 3 km E of Riberalta on rd to Guayaramerín, 11°00'S, 66°05'W, *Solomon* 7682 (MICH). PERU: HUÁNUCO: Prov. Leoncio Prado, Moena, cerca a Tingo María, *Woytkowski* 1187 (MICH); Santa Tereza, valle del Huallaga, *Woytkowski* 1232 (ECON).—LORETO: Prov. Coronel Portillo, Pampa de Sacramento, cerca Pucallpa, *Ferreira H.* 1184 (GH, MICH, US); Prov. Alto Amazonas, entre Yurimaguas y Chambira, *Ferreira H.* 4897 (MICH, US); Prov. Coronel Portillo, on Rio Aguaytia, 08°50'S, 75°20'W, *Fosberg* 28875 (MO); Balsapuerto, *Klug* 3075 (A, BM, F, G, K, MO, NY, S, US); Prov. Ucayali, Canchahuayo (Río Ucayali), 07°05'S, 75°10'W, *Vásquez et al.* 6970 (MO); Mariscal Castilla, Calabococha, 03°55'S, 70°30'W, *Vásquez & Jaramillo* 9319 (MICH).—SAN MARTÍN: ca. 10 km NE of Tarapoto, *Gentry et al.* 37915 (MICH); San Martín, 5–15 km E of Shapaja on rd to Chazuta, 06°36'S, 76°10'W, *Knapp & Mallet* 7026 (MICH); Prov. Mariscal Cáceres, Dito. Uchizo, en la carretera a Río Uchizo 2 km del caserío Nuevo Progreso, *Schunke V.* 3219 (COL, F, G, NY, US); Prov. Mariscal Cáceres, Dito. Tocache Nuevo, Quebrada Luis Sálas (5 km NE de Puerto Pizana), *Schunke V.* 6578 (GH, MO).

REPRESENTATIVE SPECIMENS (anterior style clawed). **Colombia.** AMAZONAS: Leticia, Oct 1946, *Black* s.n. (IAN); Río Igara-Paranaí (affl. Río Putumayo), La Chorrera, *Gasche & Desplats* 59 (K, MICH).—ANTIOQUIA: Mpio. Caucasia, along rd to Nechí, 24 km from Caucasia-Planeta Rica rd, 08°04'N, 75°05'W, *Zarucchi et al.* 4903 (MICH).—CAQUETÁ: 6 km SE of Morelia along rd to Río Pescado (SW of Florencia), *Davidse* 5644 (COL, MICH); Río Arteguaza, 9 km S of Florencia,

Plowman & Kennedy 2282 (F, GH, M, NY, P, S, US).—**META:** Villavicencio, *Killip 34346* (COL, S); Sierra de la Macarena, Río Guapaya, *Philipson et al. 2124* (COL).—**VAUPÉS:** rd from Mitú to Monfort, *Davis 107* (COL, GH, MICH). **VENEZUELA:** AMAZONAS: alrededores de San Juan de Manapiare, 05°18'N, 66°03'W, *Agostini 1504* (MICH); Río Orinoco, Isla del Ratón, 05°02'N, 67°45'W, *Breteler 4721* (F, K, MO, NY, US, WAG); Depto. Atures, 20 km SE de Puerto Ayacucho por la carretera Puerto Ayacucho-El Gavilán, 05°32'N, 67°24'W, *Cuello & Fernández 508* (MICH); El Gavilán, 30 km al E de Puerto Ayacucho, *Fernández 2950* (NY); Río Venturi, La Ceiba, bajo del Salto Tencua, *Foldats 147A* (NY, VEN); Depto. Río Negro, cerca de Shabono Yanomami ubicado a la izquierda del Río Orinoco y a la derecha de la desembocadura del Río Mavaca, 02°30'N, 65°10'W, *Guanchez 656* (MICH); Cerro Camani, *Maguire 31802* (NY); ad flumina Casiquiare, Vasisva, et Pacimoni, *Spruce 3277* (BR, G, K, NY, W); Depto. Atabapo, Río Cunucunuma, entre el Cerro Duida y Huachamacari, 03°40'N, 65°45'W, *Steyermark et al. 126178* (MICH).—ARAGUAS: Pozo del Diablo, cañada del Río Yuare, Maracay, *Baldillo 3782* (F, NY); Rancho Grande, Maracay, *Ferrari 745* (NY), *Vogelsang E10* (MY).—BARINAS: Ticoporo Forest Reserve, 08°15'N, 70°45'W, *Breteler 3678* (G, MER, NY, S, U, US, VEN); entre Km 469-470, carretera Barinas-San Cristóbal, *Cárdenas de Guevara et al. 2565* (MY); 1-2 km NE de Bumbum, ca. 68 km SW of Barinas, *Gentry et al. 11142* (MICH, MO, VEN).—BOLÍVAR: Pica Caicara del Orinoco-San Juan de Manapiare, Río Suapure, 202 km al S de Caicara, ca. 07°N, 67°W, *Delascio & López 2766* (VEN); Santa María de Erebato, Río Erebato, 05°05'N, 64°40'W, *Steyermark et al. 109847* (K, NY).—CARABOBO: Dto. Valencia, carretera Valencia-El Palotal-El Paito-Los Naranjos, *Bunting 4597* (NY); Guataparo, Valencia, *Saer 865* (VEN).—DISTRITO FEDERAL: Caracas, *Bredemeyer 206* (W); Depto. Vargas, camino entre Osma y Oritapo, *Benítez de Rojas 588* (MY).—FALCÓN: carretera Yaracal-Araurima, 8 km de la carretera Yaracal-Tucacas, *Cardozo et al. 65* (MICH); El Guanábano, 27 km S de Puerto Cumarebo, *Flora Falcón 343* (MICH, MO, U); Dto. Silva, ca. 21 km W of Tucacas, *Wingfield 12696* (MICH).—LARA: Dto. Palavecino, carretera entre Manzanito y El Altar, *Burandi, Jr., & Smith V0075* (MICH).—MERIDA: above dana site on Río Caparo, 31 km ESE of Santa Barbara, ca. 07°41'N, 71°28'W, *Liesner & González 9267* (MICH, VEN).—PORTUGUESA: Dto. Ospino, carretera La Aparición de Ospino-Moroturo, 09°31'N, 69°26'W, *Aymard & Cuello 6577* (MICH); Dto. Araure, carretera Hoja Blanca-Guayabal-El Rechazo, *Cuello & Cuello 59* (MICH).—TÁCHIRA: E of San Cristóbal and 40 km W of Santa Barbara, rd W or NW of Abajales, *Sobel & Stridwick 2108* (NY).—TRUJILLO: Boconó, *López-Palacios 395* (MER, VEN).—ZULIA: Dto. Colón, hacienda El Rosario, 18 km E de la carretera Machiques-La Fría, 12 km N de Río Catatumbo, *Bunting 6475* (MICH, VEN); Dto. Colón, entre Casigua El Cubo y Km 8 de la vía rumbo al Palmira, *Bunting 7328* (MICH); Dto. Perija, entre Km 16 de la carretera Machiques-La Fría y Calle Larga y San José, *Bunting 10816* (MICH); Dto. Perija, between Río Yasa and Río Tucueo along the Machiques and Los Angeles de Tucue rd, 09°50'-56'N, 72°40'-44'W, *Davidse et al. 18390* (MICH). **Ecuador:** MORONA-SANTIAGO: Tunantza, Jíbaro settlement near Macuma, ca. 50 km NE of Macas, *Lugo S. 3718* (GB, MICH); El Centro Shuar Kankain (Cangaine), Río Kankain (Cangaine), 02°20'S, 77°41'W, *Shiki RBAE219* (NY).—NAPO: carretera Hollín-Loreto-Coca, entre Avila y Río Pocuno, 00°39'S, 77°22'W, *Cerón et al. 2879* (MICH); Parque Nacional Yasuni, Pozo Petrolero "Cowí" de Conoco, 00°55'S, 76°20'W, *Coello 171* (MICH); Puerto Francisco de Orellana (Coca), ca. 40 km SE of town, Auca oil field, 00°42'S, 76°52'W, *Balslev & Madsen 10595* (AAU, MBM, MO, NY); near end of the Auca oil field rd, 00°44'S, 76°54'W, *Brandbyge & Ananza 30109* (AAU, MICH); rd Coca (Puerto Francisco de Orellana) to Curaray, ca. 40 km SE of Coca, *Harling et al. 14757* (GB, MICH); Dureno on Río Aguarico, *Harling & Andersson 16605* (GB, MICH); Río Auyabeno, near Puerto Montúfar, 00°06'S, 76°01'W, *Holm-Nielsen et al. 21281* (AAU); Río Aguarico, Monte Cristi, 00°18'S, 76°11'W, *Holm-Nielsen et al. 21666* (AAU); Estación Experimental de INIAP, San Carlos, 6 km SE de los Sachas, *Neill et al. 6216* (MICH); a 2 km de Jatun Sacha, en vía a Tena, 5 km de Misahualli, 01°08'S, 77°30'W, *Palacios 2789* (MICH).—PASTAZA: 31 km N of Puyo on rd to Tena, side rd E of Cajabamba, 00°15'S, 77°50'W, *Boom & Beardsley 8436* (MICH); Curaray (Jesús Pitishka), *Harling & Andersson 17450* (GB, MICH); Río Chullana, ca. 15 km N of Puerto Sarayacu, *Lugo S. 4184* (GB, MICH); Río Curiare, ca. 8 km W of Puerto Sarayacu, *Lugo S. 4238* (GB, MICH); vicinity of El Porvenir, ca. 5 km W of Puyopungo, *Lugo S. 4942* (GB, MICH); trail to Copatazo, 10 km S of Sarayacu, *Lugo S. 5519* (GB, MICH); carretera de Petro-Canadá, vía Auca, 115 km S de Coca, 6 km S del Río Tiguino, *Zak & Rubio 4339* (MO). **Brazil:** PARÁ: Tucuruí, Ramos 1115 (INPA). **Peru:** AMAZONAS: valle del Río Santiago, ca. 65 km N de Pinglo, Quebrada Caterpiza, *Huashikat 1110* (MICH, MO); Prov. Bagua, 8 km E of Montenegro at Km 286 E of Olmos on the Mesones-Muro hwy, *Hutchison & Wright 3781* (F, GH, K, M, MICH, MO, NY, P, US); Mirana, *Woytkowski 5649* (G, GH, MO, US); Prov. Bagua, valley of the Río Marañón above Cascadas de Mayasi, Km 276-280 of Marañón rd, *Wurdack 1841* (F, NY, S, US).—LORETO: Maynas, Shusuna, carretera a Zungarococha, *Ayala 437* (AMAZ, MO); Río Yuvinetó,

affluent du Río Putumayo, Río Putumayo, *Barrier 441* (AMAZ, MICH); cerca de Zúñago, Cocha, 15 km SW de Iquitos, *Dodson 2809* (MO, SEL, US); Nauta, Río Marañón above mouth of Río Ucayali, 04°30'S, 73°30'W, *Gentry et al. 29968* (AMAZ, MICH); Maynas, Quebrada Sucursari, Río Napo, 03°15'S, 72°55'W, *Gentry et al. 42673* (MICH); Mishuyacu, near Iquitos, *Klug 113* (F, NY, US); Prov. Loreto, Pampa Hermosa and vicinity, Río Corrientes, 1 km S of junction with Río Macusári, 03°15'S, 72°50'W, *Lewis et al. 10651* (MO); Maynas, Iquitos, Quista Cocha, *McDaniel 10907* (F, MO); Requena, Río Tepiche, Santa Elena, *McDaniel & Marcos 11263* (F, MO); Santa Ana on the Río Nanay, *Ll. Williams 1225* (F, US).

Stigmaphyllum sinuatum is a common and polymorphic species of the lowlands of northern South America to which several names have been applied. Its flowers are borne in pseudoracemes arranged in compound dichasias and thyrses with axes to the sixth order. The androecium differs from that of most species in that the posterior-lateral stamens bear unmodified anthers. Only the anterior-lateral stamens have the connective enlarged and the locules reduced; sometimes one or rarely both locules are absent. All anthers are glabrous. The styles are usually bearded adaxially but sometimes glabrous, and the posterior ones are always foliolate; the anterior style either bears two folioles or lacks them, or rarely is irregularly ornamented. The samara, like that of most species, has a large flaring dorsal wing, and the nut commonly bears on each side 1–3 lateral winglets and/or spurs and crests.

Stigmaphyllum sinuatum is highly variable in the shape and abaxial pubescence of the leaves, the color of the petals, and the presence of folioles on the anterior style. Representatives combining the various expressions of these characters have been segregated as species. Although the extremes are striking and may show some geographic correlation, they are linked by intermediates occurring throughout the range and thus are not accorded taxonomic recognition here. In Fig. 4, the various combinations of leaf pubescence and ornamentation of the anterior style are mapped; however, this map reflects more the itineraries of collectors than the range of the species.

The laminas vary from triangular to ovate to cordate to elliptical to orbicular to obolate to reniform, and are cordate to auriculate at the base to sometimes truncate or acute in smaller ones. In general, plants from the eastern and western part of the range have rather broad laminas (i.e., broadly elliptical to orbicular to obolate to reniform), and those from the central part are more likely to have triangular to ovate to elliptical ones. The appressed abaxial pubescence imparts a silvery metallic sheen. The abundance of the hairs varies greatly from sparse (the hairs barely if at all touching) to moderate (the hairs touching and/or overlapping but the epidermis visible) to so dense that the epidermis is hidden by a silver mat of hairs. The very dense pubescence is most common in plants from the eastern part of the range (Fig. 4).

The petals range from entirely yellow to yellow with varying amounts of red. If the petals in bud are yellow, they may remain yellow at maturity, or the flag and sometimes also the lateral petals may show red streaks. If the petals are red in bud, the expanded petals may be mostly red with only a yellow spot on the adaxial surface, may be mostly yellow but with a broad red band along the margin, or only the flag may be red and the lateral petals mostly yellow with a little red, either in streaks or along the margin. Sometimes the red pigment is evident only in bud and the expanding petals but is absent from the mature petals. Most likely, pure yellow limbs are slightly larger than those suffused with red. Specimens from Colombia, Ecuador, and Peru nearly always have yellow petals lacking red,

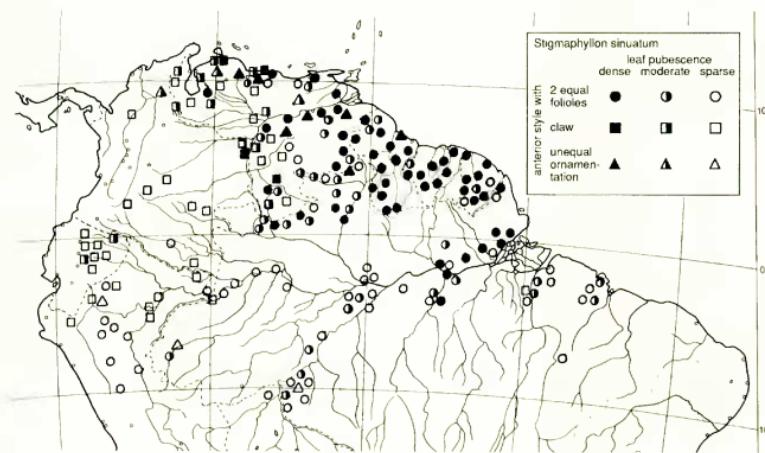


FIG. 4. Distribution of the variants in leaf pubescence and ornamentation of the anterior style of *Stigmaphyllum sinuatum*.

but yellow petals with minor red markings have also been reported (e.g., Ecuador: *Harling et al. 14757*; Colombia: *Davis 107*; Peru: *McDaniel 10907*). The petals are abaxially sericeous in nearly all collections from Amapá, Brazil, and rarely in specimens from other parts of the range (e.g., *Teixeira et al. 1340*, Amazônas, Brazil; *Murça Pires et al. 620*, Pará, Brazil; *Wurdack 34434*, Bolívar, Venezuela). Pubescent petals are otherwise known only in *S. singulare* C. Anderson, a very different species of Venezuela (Táchira) and Colombia (Norte de Santander).

The names *Banisteria heterophylla*, *B. splendens*, *Stigmaphyllum splendens*, *S. fulgens*, *S. hypoleucum*, and *S. purpureum* are based on collections from eastern Venezuela and the Guianas. The laminas of plants from the northeastern part of the range are usually orbicular to oblate or reniform and densely silver-sericeous below (Fig. 4, closed symbols). The petals have broad red-orange margins or may be entirely red with only a central yellow spot abaxially. The anterior style bears foliicles.

In plants from the western part of the range as well as from the area of Belém (Pará), the Rio Tocantins and its tributaries, and Maranhão, all in Brazil, the laminas are most often broadly cordate to broadly ovate or sometimes narrower, though the orbicular to oblate/reniform shape is also infrequently encountered; the abaxial hairs are sparsely to moderately abundant (Fig. 4, open and partly closed symbols, respectively). Most commonly, the petals are yellow. The form with abaxially sparsely to moderately sericeous laminas and foliolate anterior styles is commonly assigned to *S. martianum*, a name based on a collection from Manaus (Amazônas, Brazil). The majority of specimens from the vicinity of Manaus, including the type of *S. martianum*, have triangular to ovate laminas that are acute to truncate to cordate at the base and sparsely sericeous below; the petals are yellow.

Much overlap occurs in the general ranges of the leaf variants. The laminas of plants of Guyana are often not quite as densely pubescent as those from French Guiana and Suriname. In a few collections from French Guiana, including the type of *S. richardianum*, the elliptical to broadly so to cordate (but not orbicular)

laminas are sparsely to moderately sericeous below, and the petals often lack red pigments (e.g., *Grenand* 2136, *Oldeman* 1982, *Jacquemin* 1610). A few collections of these variants are also known from Guyana (e.g., *de la Cruz* 2578, *Sandwith* 664), Suriname (e.g., *Lindeman* et al. 47), eastern Venezuela (e.g., *Sobel & Strudwick* 2274, *Sucre*), eastern Brazil (e.g., *Cowan* 38473B, *Irwin* et al. 47382, *Amapá*). Some collections from Manaus have yellow-red petals and very broad (suborbicular) though abaxially sparsely pubescent laminas (e.g., *Campbell* et al. P20920, *Maas & Maas* 362, *Chagas* INPA 3679). Most collections from the vicinity of Santarém have broad, abaxially densely sericeous laminas and red-yellow petals; yet, plants with sparsely to moderately pubescent laminas and yellow petals occur there as well (e.g., *Silva & Souza* 2522). In Roraima, the entire spectrum of variation in laminar shape and pubescence and in petal color is encountered. In some specimens from this region and elsewhere (e.g., *Prance* 3964, 10909, *Roraima*; *Thomas* et al. 5034, *Rondônia*), the abaxial surface of the young leaves and smaller ones near the inflorescence is densely sericeous, whereas that of the larger leaves is only moderately pubescent. The broad laminar shape and yellow-red petals typical of the eastern variant is also found in plants collected along the Rio Madeira (e.g., *Teixeira* et al. 980, *Prance* et al. 5180) and in northern Rondônia (e.g., *Prance* et al. 6658, *Thomas* et al. 4949) as well as along the Rio Mamoré and adjacent Bolivia (e.g., *Solomon* 7682); however, the laminas are only sparsely to moderately pubescent below. In most collections from Ecuador and Peru, the laminas also are broadly elliptical or cordate to orbicular.

In a few species of *Stigmaphyllo*n characterized by foliolate anterior styles, individuals are occasionally encountered in which the folioles of the anterior style are greatly reduced or one or both are absent. Such atypical forms are known in *S. adenodon* Adr. Juss. (Peru), *S. lindenianum* Adr. Juss. (Yucatan Peninsula, Mexico), and *S. sagraeanum* Adr. Juss. (Cuba). In *S. sinuatum*, plants from the greater part of the range have foliolate anterior styles (Fig. 4, circles), but in many from western Venezuela (and also Amazonas and western Bolívar), Colombia, Ecuador, and northern Peru (Amazonas and Amazonian Loreto) the apex of the anterior style is efoliolate but extended into a claw 0.7–1.3 mm long (Fig. 4, squares). Exceptions to this geographical pattern are rare but not unknown; for example, in *Ramos* 1115 from Tucurúi, Pará, Brazil, the anterior styles are efoliolate, and in *Maguire* et al. 44142 from Araracuara, Amazonas, Colombia, they are foliolate. The names *Stigmaphyllo*n *brachiatum* and *S. monancistrum* are based on the efoliolate form. In his treatment of *Stigmaphyllo*n in the Guayana Highlands, W. R. Anderson (1981) commented on the morphological diversity of this species and questioned the validity of taxonomic recognition of the efoliolate variant as *S. brachiatum*.

Intermediate style forms occur, infrequently, throughout the range of *S. sinuatum* (Fig. 4, triangles). In these individuals, the anterior style may bear only one or two greatly reduced folioles, only one large foliole, or one reduced and one large foliole. The size and/or presence of such folioles may vary even within the same inflorescence or even the same umbel. Such intermediates otherwise share the characters of "normal" plants of their part of the geographic range. The following collections serve as examples of plants with variable anterior styles: Guyana, *Jenman* 6875, two large to tiny folioles; Suriname, *BBS* 254, 259, one foliole or two unequal folioles; Venezuela, *Trujillo* 4127 (Aragua), *Pittier* 5699, 12105, *Diederichs* 88 (Yaracuy), *Steyermark* 61019 (Azoátegui), *Stergios* 6224, 8902, *Bernardi* 7226 (Bolívar), all with one foliole or two unequal folioles; Colombia, *García B.* 18248 (Norte de Santander), one foliole or two unequal folioles;

Brazil, *Maas* PI2815 (Acre), *Vieira et al.* 546 (Rondônia), all with one foliole or two unequal folioles; Peru, *Huashikat* 1375 (Amazonas), two folioles or one folio and a narrow lip. In one Venezuelan collection (*Romero* 545, Yaracuy), the anterior styles varies from hooked, i.e., without folioles, to bearing 1-2 large folioles. The absence or variability of folioles of the anterior style might indicate irregularities caused by hybridization; however, a preliminary survey of pollen showed no correlation between absence of folioles and presence of malformed pollen grains. In most samples of all three variants of ornamentation of the anterior style only few misshapen grains were found; the pollen was mostly 95-99% normal (at least 91% normal). The few exceptions are: *Oldeman* 1982 (French Guiana, 86% normal), *Maguire* 44142 (Colombia, Amazonas, 85% normal), *Prance et al.* P25427 (Brazil, Pará, 58-72% normal), all three collections with foliolate anterior styles; and *Breteler* 4721 (Venezuela, Amazonas, 83-84% normal), anterior styles efoliolate. Only in two collections did the pollen consist entirely of misshapen, thick-walled grains: *Broom & Beardsley* 8436 (Ecuador, Pastaza, anterior styles efoliolate) and *Bernardi* 7226 (Venezuela, Bolívar, anterior styles with variable folioles).

Because *S. sinuatum* is so variable and widespread, sympatric species with abaxially sericeous laminas have often been confused with it; for separation from these species, see the key presented above and the discussions of *S. argenteum*, *S. cardiophyllum*, and *S. convolvulifolium*.

In addition to taxonomic difficulties, *S. sinuatum* has also been a source of nomenclatural problems. The species was first described by Willdenow (1799) as *Banisteria heterophylla*. De Candolle (1824) considered this name unsuitable and in his *Prodromus* substituted the name *B. splendens*. Cuatrecasas (1958) published the name *Stigmaphyllo splendens*; however, that name is also superfluous, because he cited in synonymy two legitimate available names, *S. hypoleucum* and *S. purpureum*. The epithet "heterophyllum" is no longer available in *Stigmaphyllo*, because it has already been used for another species [*S. heterophyllum* Hooker = *S. littorale* Adr. Juss.]. Matters were also confused by Lamarck (1783), who misapplied a Linnaean name, *B. fulgens*, to the species here discussed [*B. fulgens* L. = *S. emarginatum* (Cav.) Adr. Juss.]. This error was noted by Cavanilles (1790), who had corresponded with J. E. Smith, then the owner of the Linnaean herbarium. Cavanilles treated the species under the name "*B. fulgens* Lam." When Jussieu (1800, 1843) published *S. fulgens*, he noted that he was basing the name on *Banisteria fulgens* in the sense of Lamarck, not Linnaeus, but also listed *B. heterophylla* Willd. and *B. splendens* DC. in synonymy; *S. fulgens* Adr. Juss. is thus a superfluous name. Niedenzu (1900, 1928) followed Jussieu and cited this species under the name "*S. fulgens* (Lam.) Juss."

W. R. Anderson (1981) also discussed the nomenclatural difficulties. He noted that the names *S. fulgens* and *S. splendens* are illegitimate and that the name *S. heterophyllum* had already been used for another species. He adopted *S. hypoleucum* Miquel, the earliest legitimate name for the variant with abaxially densely sericeous leaves, but also indicated that this name would be displaced by *S. richardianum* Adr. Juss. and *S. martianum* Adr. Juss., if their types are included in this species.

De Candolle's *B. splendens* (i.e., *B. heterophylla* Willd.) was based on the variant in which the lower leaf surfaces are very densely pubescent. De Candolle also had a specimen of the form in which the leaves are only moderately sericeous below, a Perrotet collection from French Guiana; this specimen is the type of his name *Banisteria sinuata*, also published in the *Prodromus* (1824). Jussieu (1840, 1843) made the combination in *Stigmaphyllo*, but expressed some doubts that

his concept of the species and de Candolle's *B. sinuata* were the same. Unfortunately, it proved that the Perrottet specimens that Jussieu saw at P and annotated as *S. sinuatum* belong to *S. palmatum* (Cav.) Adr. Juss., and were not duplicates of de Candolle's type of *B. sinuata*, as Jussieu believed. In Jussieu's defense, it should be noted that *S. palmatum* is also greatly variable in leaf shape and that its type, erroneously, was said to be from Hispaniola; the type of *S. palmatum* has deeply palmate laminas, whereas the Perrottet specimens Jussieu saw have unlobed leaves. Niedenzu confounded the matter further by recognizing de Candolle's *B. sinuata* as a variety, first (1900) of *S. hastatum* Griseb. [a superfluous name based on *B. angulata* Vell. (= *S. auriculatum* (Cav.) Adr. Juss.), which Grisebach misapplied to *S. littorale*] and later (1928) of *S. sagittatum* [sensu Niedenzu, including *S. hastatum*; *S. sagittatum* (Cav.) Adr. Juss. = *S. palmatum*]. Jussieu's and Niedenzu's misinterpretations of *B. sinuata* led later botanists to apply the name *S. sinuatum* to specimens of either *S. littorale* or *S. palmatum*. My recent examination of the type of *B. sinuata* confirmed that it belongs to the species here discussed, and that in *Stigmaphyllum* the correct name is *S. sinuatum* (DC.) Adr. Juss.

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